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(54) **Gaming or amusement machine**

(57) A gaming or amusement machine has a spinning reel device 4 and video screen 2 on which a video game may be displayed. Operation of the machine to play the video game may take place only following a winning event displayed on the reels.

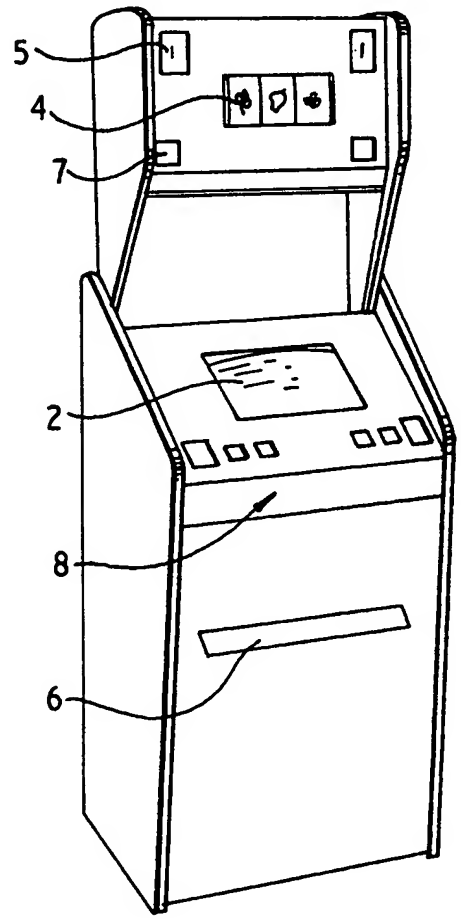

FIG.1.

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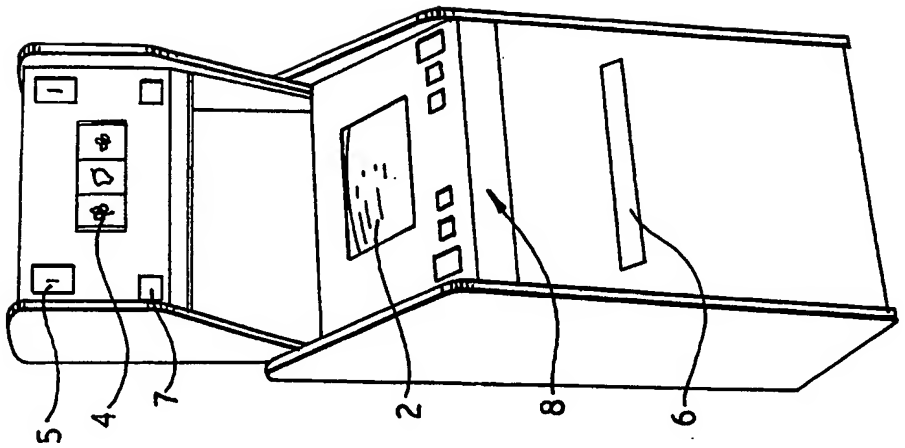


FIG.1.

FIG.2.

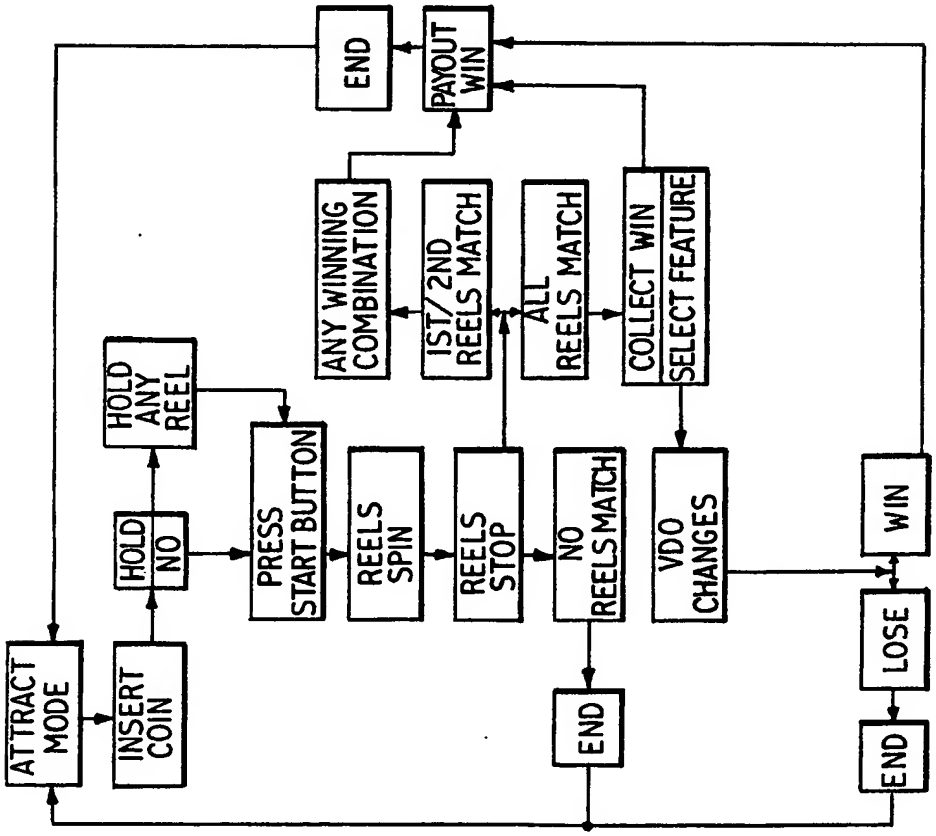
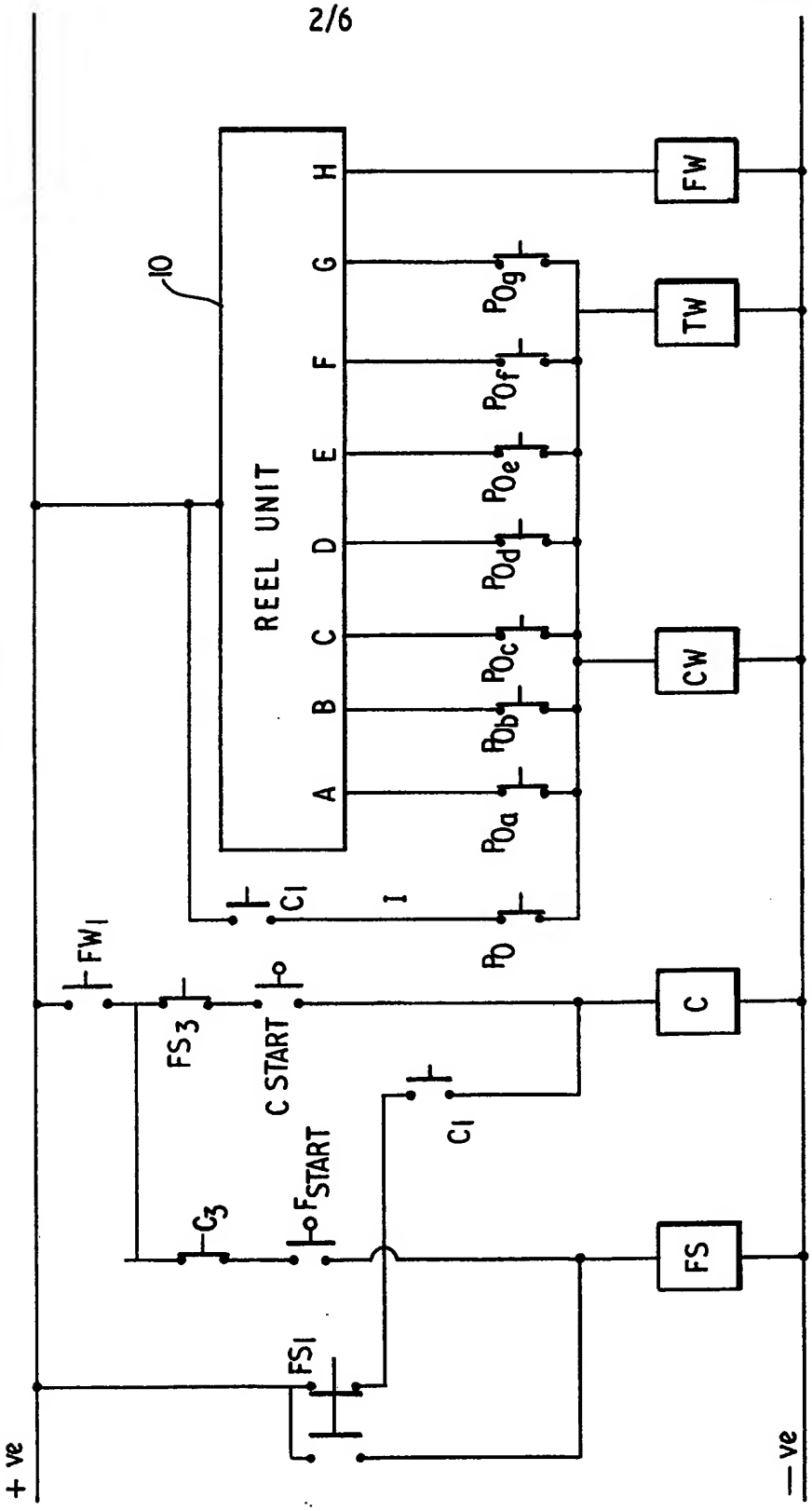


FIG.3A.


+ ve
— ve
10
REEL UNIT
A
B
C
D
E
F
G
H
FW
TW
CW
C
FS
FW1
FS3
C START
F START
C3
FS1
C1
I
PO
POa
POb
POc
POd
POe
POf
POg

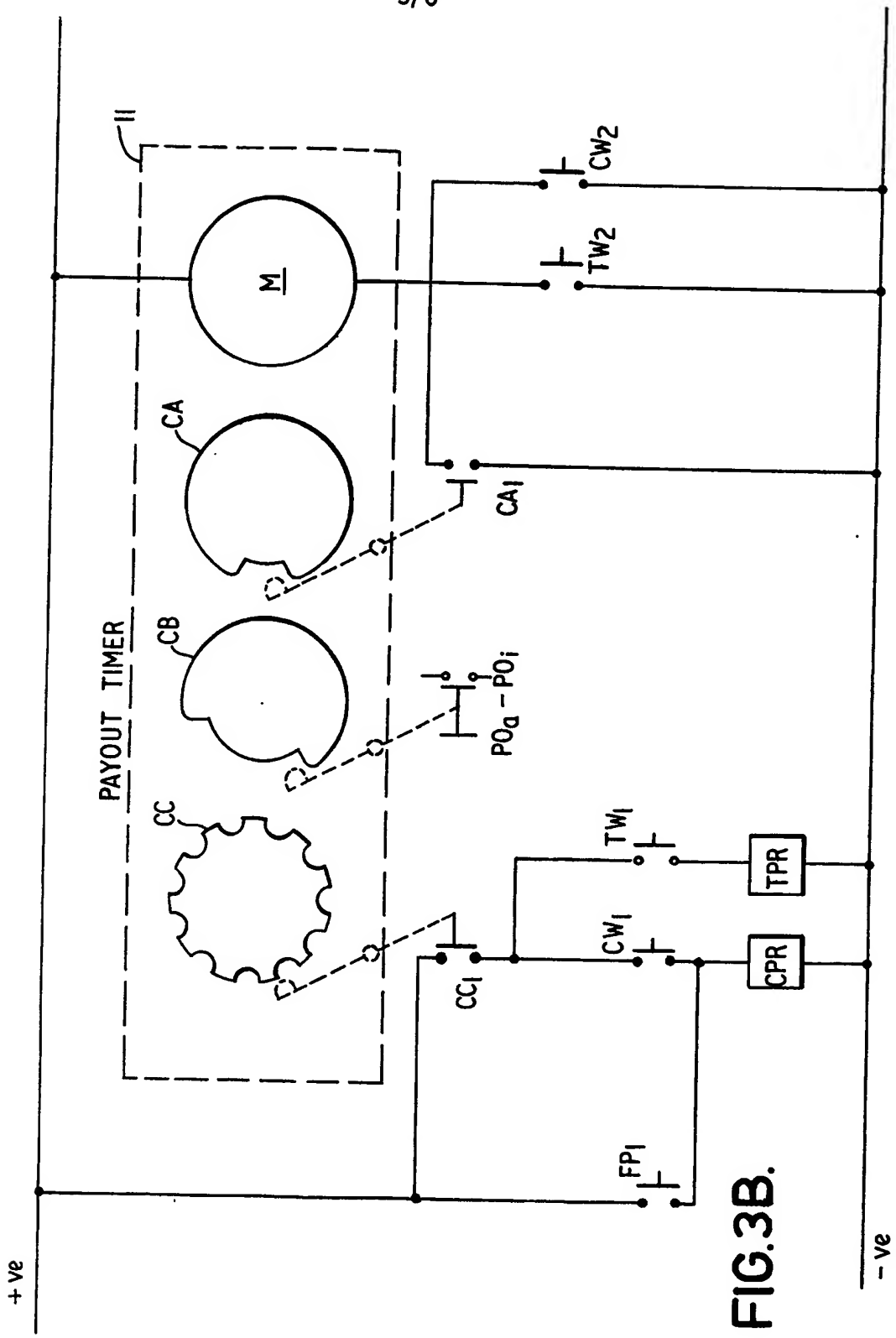

PAYOUT TIMER
M
CA
CB
CC
CA1
CW2
TW2
PO_a - PO_i
TW1
CW1
CC1
FP1
TPR
CPR
+ve
-ve

FIG.3B.

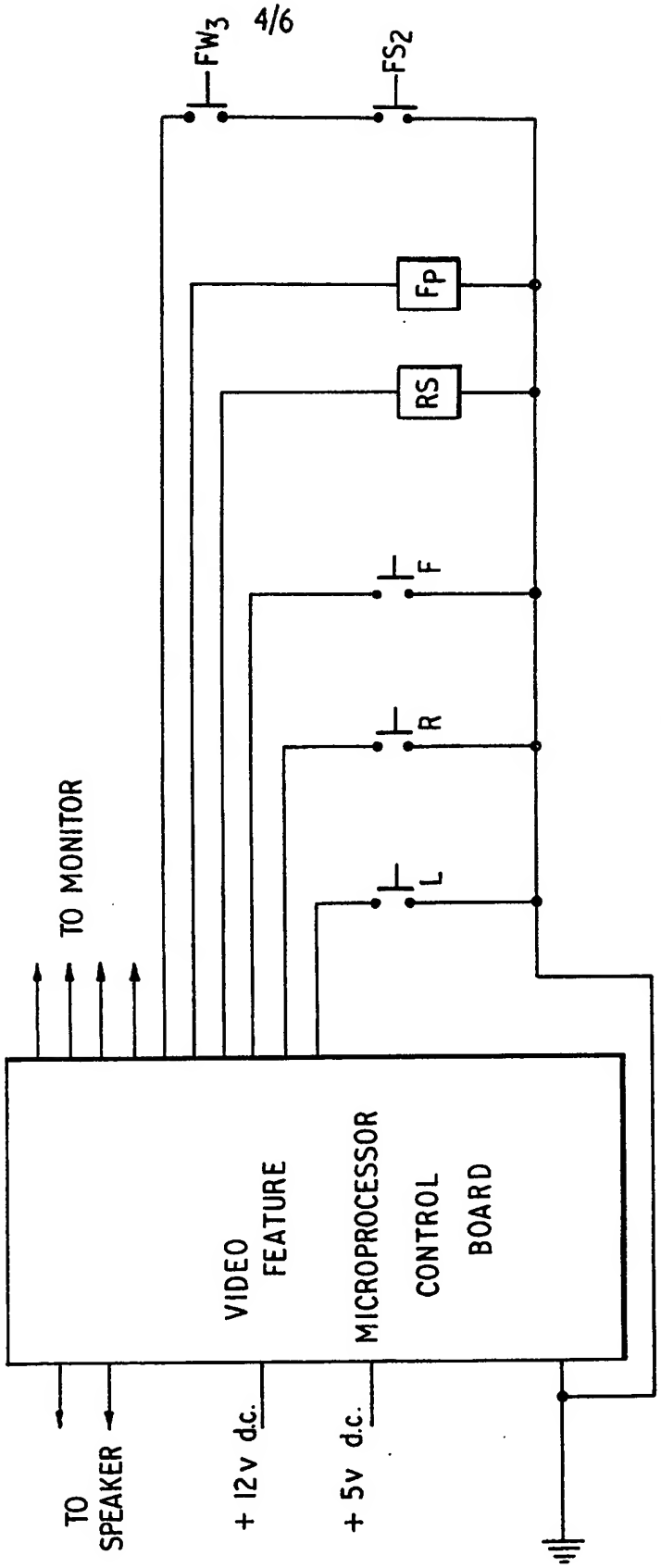

FW3
FS2
Fp
RS
F
R
L
TO MONITOR
VIDEO FEATURE MICROPROCESSOR CONTROL BOARD
TO SPEAKER
+ 12v d.c.
+ 5v d.c.

FIG.3C.

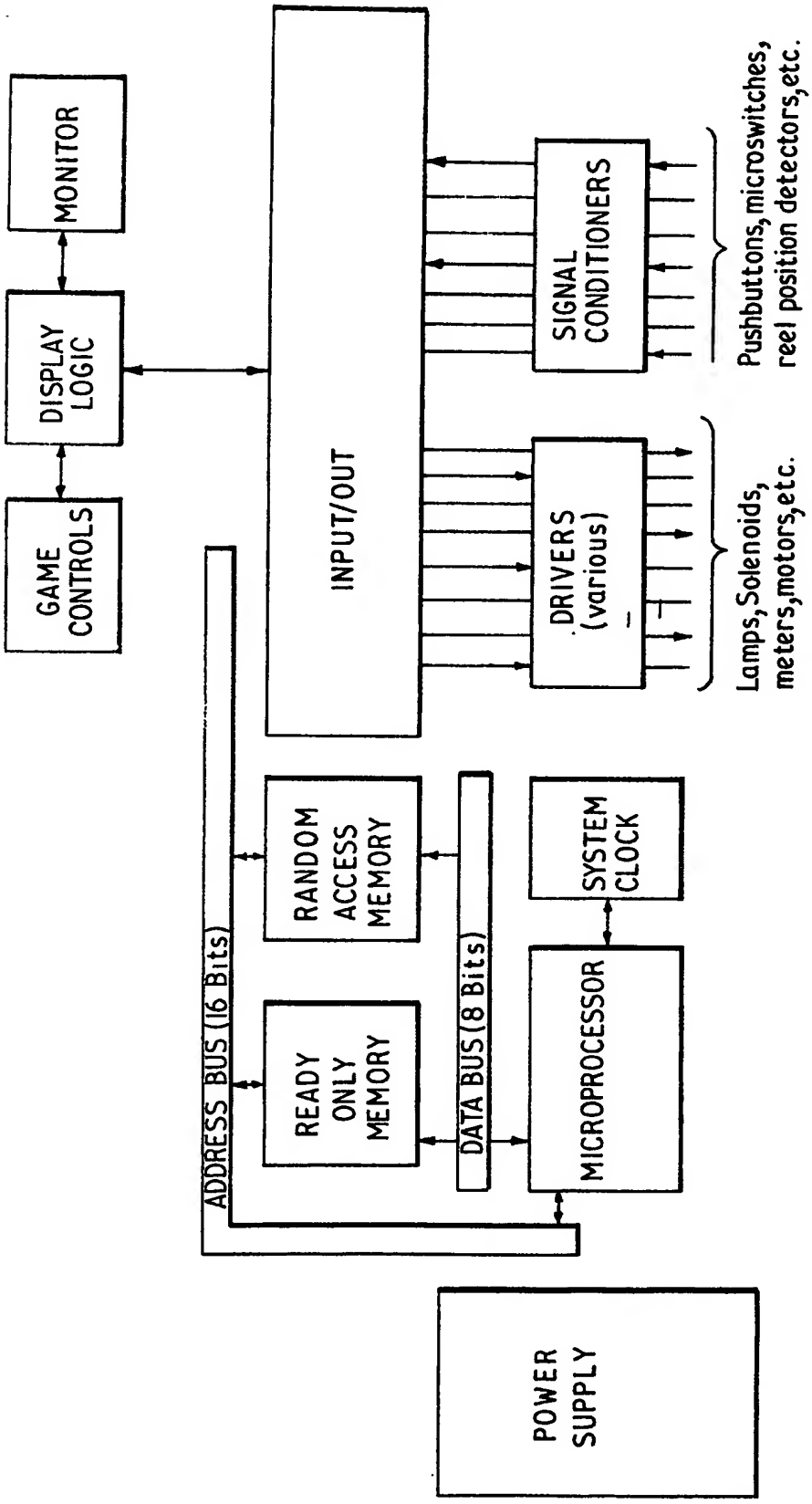

MONITOR
DISPLAY LOGIC
GAME CONTROLS
INPUT/OUT
SIGNAL CONDITIONERS
Pushbuttons, microswitches, reel position detectors, etc.
DRIVERS (various)
Lamps, Solenoids, meters, motors, etc.
ADDRESS BUS (16 Bits)
RANDOM ACCESS MEMORY
READY ONLY MEMORY
DATA BUS (8 Bits)
SYSTEM CLOCK
MICROPROCESSOR
POWER SUPPLY

FIG.4.

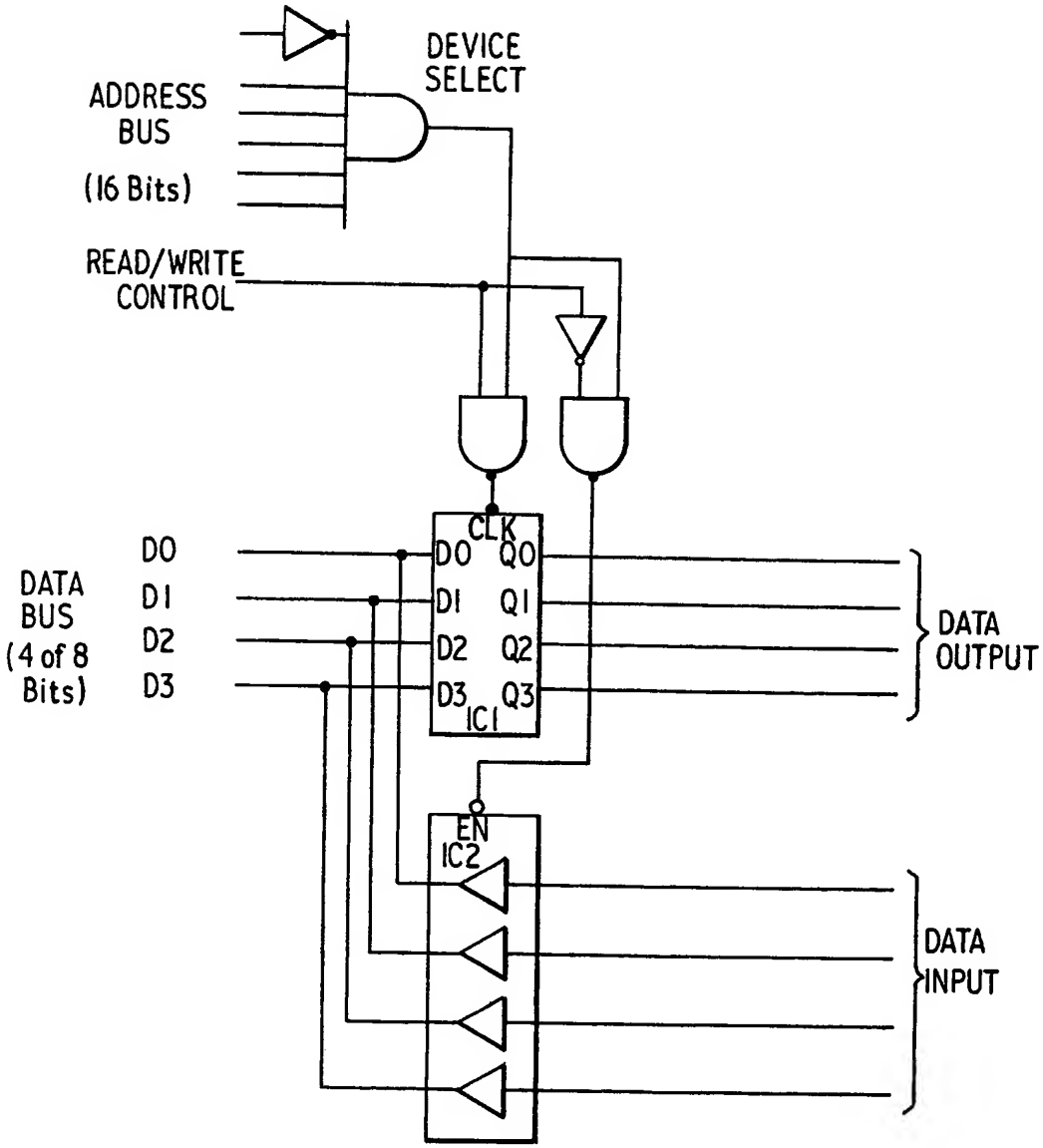

DEVICE
SELECT
ADDRESS
BUS
(16 Bits)
READ/WRITE
CONTROL
CLK
DO
DI
D2
D3
QO
Q1
Q2
Q3
IC1
DATA
BUS
(4 of 8
Bits)
DO
DI
D2
D3
DATA
OUTPUT
EN
IC2
DATA
INPUT

FIG.5.

SPECIFICATION

Improved gaming or amusement machine

A gaming or amusement machine is known which comprises a group of reels which bear symbols on their peripheral surfaces. The reels are made to spin following the insertion of a coin or token, and the relative positions of the reels when they have all been brought to a halt determines whether a winning event has occurred and, if so, the value of a prize in the form of coins or tokens delivered automatically by the machine. The amusement value of such a machine is limited.

To increase the amusement value of a gaming machine of this type, it is proposed herein that the machine should be provided with a video display unit. This unit may be constituted by, incorporate or be associated with a video game unit capable of being brought into operation only following a particular winning event on the reels, referred to herein as a feature win, the player being permitted, following a feature win, to initiate operation of the video game or, if the machine is so adapted, to forego such operation and instead draw a cash or token prize. While it is possible, within the context of the present proposal, for the video game to be played for amusement only, it is particularly envisaged that prize in the form of one or more coins or tokens should also be obtainable following a winning event on the video game. In addition, or alternatively, the video display unit may be used to display information concerning the spinning reel game, for example, concerning the winning combinations, stake and value of prizes to be won. This video display may be readily changed, simply by replacing or reprogramming a microprocessor control unit, without the trouble or expense at present involved in replacing a complete machine as is necessary at present following, for example, changes in Government gaming regulations.

In more detail, the gaming machine now proposed may comprise a casing designed to display to the player a video screen and a set of three juxtaposed reels which are rotatable about a common axis and whose peripheries bear symbols which may be of the well-known fruit machine type. Slots are provided in the casing through which one or more coins or tokens are inserted to play the machine, and through which coins or tokens won by a player are ejected. When the machine is initially switched on, it enters an attract mode in which the screen displays information such as details of the machine site, the name of the game, instructions for playing the first part of the game, using the spinning reels, and details of the prizes available for winning events on the reels. The information displayed may changed at intervals in accordance with the programming of a microprocessor unit with which the machine is also provided. A winning event on the reels is the alignment of predetermined symbols on two or more of the reels, the winning symbols being displayed on the screen while the machine is in the initial attract mode and while the reels are in motion. There may be a number of different winning events, as is conventional with a machine of this type, the possibility being provided of winning any of a number of different sums, depending upon which symbols align with a "win-line" associated with an aperture through which the reels may be viewed.

Controls are also provided for playing a video game programmed into the microprocessor unit. This unit may be programmed such that the skill of the player is used to control the position or movement of an image on the screen so that a winning event in the video game occurs if the player demonstrates sufficient skill. Alternatively, the image produced may be of a random nature, in which case the winning event may be the display of one or more predetermined images in preference to other. The arrangement may be such that the player may select the game to be played from a number of games of one or both types programmed into the microprocessor unit.

The video display unit is arranged to respond to operation of the controls only following a predetermined winning event of the reels, the player being permitted to select either the drawing of a cash or token prize following a feature win on the reels, or the opportunity to stake all or part of the value of this prize against the outcome of a video game.

Assuming that the player attracted to the machine inserts a coin or token, a "hold" lamp may not light, giving the player the opportunity to depress control buttons to hold one of the three reels. The player then presses a start button and the reels spin and stop. If no winning event is signified, the game ends and returns to its attract mode. If, say, two reels match, a payout occurs in the normal way. In the event, say, that all three reels match this winning event may be followed by the display on the video screen of the amount of the win and of instructions that the player should operate the controls to collect either a coin or token, or to stake all or part of the amount won on this first mechanical stage of the game upon a selected video game or skill or chance. Assuming that the player elects the latter, he operates the controls to select the video game and to play it. The selected game may be of a "space invaders" type, in which the controls are operated to move images on the screen, the winning event being the achievement of a score exceeding a predetermined figure, the score being increased or reduced in dependence on the players skill in controlling the images on the screen. Following a winning event, the machine delivers a prize. Alternatively, the microprocessor may permit the video game selected to be of a type such as "pontoon". The video screen displays playing card symbols, the controls being operated by the player to determine how many such cards are displayed. Each card displayed results in the deduction of an amount from the total won on the reels and the balance is displayed on the screen too. The microprocessor unit may also be arranged to act as the dealer and to display on the screen cards dealt to itself. Assuming that the players "sticks" after staking 30p of the winnings on the reels on three cards which total 20 points while the machine scores 19 point, the player wins and receives winnings of 60p plus change left from the

winnings on the reels.

It is possible to construct and arrange a machine in a number of different ways in order to achieve the operations and effect described above. Two examples will now be described with reference to the drawings, wherein:

Figure 1 shows the external features of a machine in accordance with the present proposal in a perspective view.

Figure 2 is a diagram to show the sequence of operations performed by the machine.

Figures 3a, 3b and *3c* show parts of the circuitry of an electro-mechanical spinning reel type gaming machine, incorporating a video display unit, in order to indicate the inter-relationship between the reel unit and video display unit.

Figure 4 is a block diagram of a microprocessor controlled spinning reel gaming machine, incorporating a video display unit, and

Figure 5 shows an interface unit for the embodiment shown in Figure 4.

Referring to Figure 1, the gaming machine shown therein comprises a casing 1 apertured to reveal the screen 2 of the cathode ray tube of a video display unit and the peripheral surfaces of three reels 4 of a reel unit. The peripheral surfaces of the reels are marked with various symbols, in particular items of fruit, and the aperture through which the reels are visible is marked with a "win line". The casing has slots 5 for the insertion of coins and a tray 6 for the reception of coins and tokens delivered by the machine as prizes. Manual controls 7 are provided for operating the reels and manual controls 8 for the control of a microprocessor control unit of the video display unit. The casing also houses a loudspeaker to which signals are supplied by the microprocessor.

Within the casing, but not illustrated, the reels are mounted on a drive shaft, each reel being coupled top the shaft by way of a slip clutch to permit the reels to be halted individually while the shaft continues to rotate. The shaft is drivable by means of an electric motor, and each reel is associated with an index solenoid which, when energised, permits the reel to rotate. Provided that microswitches associated with the coin and token slots 5 have responded to the insertion of coins or tokens of sufficient value and activated the machine accordingly for an operation, energisation of the motor circuit may be effected by closing a start push-button switch. Closing this switch also energises the motor of a control cam timer which performs one complete rotation for each operation of the machine and performs overall sequence timing. This arrangement is conventional. Also conventional, and likewise not illustrated, the machine includes a cam timer, which determines by the position in which it comes to rest, whether a "hold" is available for the next operation, in other words, whether the player may hold any of the reels stationary. Provided that this timer indicates the availability of a "hold", hold relays may be energised and latched by closing push-button switches associated with the reels. Each hold relay which is energised opens a normally closed contact in the circuit of an index solenoid to prevent its energisation and spinning of the associated reel.

Fast with each reel is a disc formed with a slot for reception of a bar for holding the reel in a fixed position. As the control cam enters three successive predetermined positions, the bars of the three reels are moved into their locking position, the reels being halted in sequence in this manner until when the third and last reel is halted, the motor driving the reels is de-energised. The reel unit is represented by the box 10 shown in Figure 3 and, in the event that the reels halt with a winning combination of symbols in alignment on the win line, the interengagement of selected studs and wipers on the reels results in the appearance of a signal on a number of outputs (A to H) from the reel unit, depending upon the prize awarded. Thus a signal of line A indicates a prize in cash of 20p, on lines B, C and D of cash prizes of 30p, 40p and 50p, respectively and on line E of a cash prize of £1. Signals on lines F and G indicate prizes of tokens valued at £1.50 and £2 respectively. A signal on line H, however, indicates a feature win, namely that the player has won the entitlement to play the video game, or to collected instead a cash prize of, say 20p in lieu.

The dispensing of the cash and token prizes for normal wins is controlled by a payout timer indicated within the box 11 in Figure 3b. This timer comprises a motor M for driving a cam, or set of cams, which cam tracks, indicated at CA, CB and CC for operating certain microswitches.

Returning to Figure 3a, the output lines A to E from the reel unit 10, are connected to a cash win relay CW, the lines F and G to a token win relay TW, and the line H to a feature win relay FW. The cash win relay CW may also be energised by a signal on a further line I which bypasses the reel unit, for a purpose which will shortly become clear. The lines A to G and I include the contacts of payout timer microswitches POa to POg and POi.

The cam track CA of payout timer 11 is associated with a contact CA1 which is closed when the cam begins to rotate and close a circuit through the payout timer motor M until the cam has rotated through one revolution, when the contact CA1 re-opens to terminate the supply to the motor. The cam track CC has a series of evenly distributed notches, the number of which is equal to the maximum cash prize in coins of a suitable value, for example, 10p pieces. During rotation of the cam a contact CC1, associated with the track CC repeatedly closes and re-opens in the circuit of cash and token payout relays CPR and TPR. The circuits of these relays also include normally open contacts CW1 and TW1, respectively, of the cash and token win relays CW and TW shown in Figure 3. The microswitches POa and POi are all closed when the cam timer is in its start position. The cam track CB is so arranged that the contacts POa to POe open successively one after the other at predetermined moments of time, and likewise the contacts POf and POg in accordance with a separate sequence. The contact POi is arranged to open at the same time as one of the contacts POa to POe, depending upon the value of the prize to be given in lieu of the entitlement to play a video game.

Each of the relays CW and TW has a normally

closed contact in the circuit of the control cam motor (not shown) so that the control cam is halted when a win signal appears on one of the output lines A to G. Each relay also has a normally open contact CW2, TW2 respectively in further circuits for energising the payout cam timer motor M.

Assuming a normal cash win, i.e. not a feature win, a signal appears on one of the output lines A to E. The payout timer is stationary in its start position so that contact POa to POe are closed. Relay CW is energised and contact CW1 in the circuit of the cash payout relay CPR and CW2 in the circuit of the motor M are closed. The motor is energised and starts to rotate the timer cam or cams. Contact CA1 closes to maintain the supply to the motor despite subsequent opening of contact CW2. Contact CC1 repeatedly closes causing a series of pulses to the supplied to the cash payout relay CPR, a contact of which responds to operate the solenoid of a meter which delivers a 10p coin in response to each pulse which it receives. The cash payout relay is energised each time that the contact CC1 closes but only so long as the relay CW remains energised and contact CW1 is closed.

Simultaneously, the cam track CB causes the contacts POa to POe to open one after another, the opening of these contacts being synchronised with the operation of the contact CC1. Thus, contact POa opens after contact CC1 has closed twice, contact POb after contact CC1 has closed three times and so one, to de-energise relay CW and prevent the delivery of further coins.

If a token win is indicated by a signal on output line F or G, a meter is operated to deliver the correct number of tokens in exactly the same way as a result of the energisation of relay TW and closing of contacts TW1 and TW2.

In the event however that the symbols aligned with the win line indicate a feature win, a signal appears on the output line H from the reel unit to energise the feature win realy FW. A first normally open contact (not shown) of this relay closes to illuminate a lamp indicating the feature win and informing the player that he may choose between collecting a cash prize or playing the video game. Contact FW1 closes in the circuit of a collect relay C and a feature start relay FS. If the player elects to take a fixed sum, he closes a switch C_{START} in the circuit of the relay C with the reault that contact C1 of this relay closes in line I to energise the cash win relay CW (which has remained un-energised because of the absence of any signal on lines A to E) and initiate operation of the payout cam timer to deliver a prize having a value determined by the length of the part of the cam tracck CB associated with contact POi, the manner described above. At the same time, contact C2 of relay C opens in the circuit of feature start relays FS to prevent use of the video unit. Contact FS1 remains in the position shown so that the relay C is latched following closing of a self-holding contact C3. Should, however, the player choose to play the video game, he closes instead switch F_{START} so resulting in de-energising of relay FS since contact C2 remains closed. Contact FS1 picks-up and relay FS latches.

Referring now to Figure 3c, the microprocessor control board of the video display unit has a circuit including contacts FS2 and FW3 of the feature win and feature start relays. Following energisation of both relays, these contacts close, signalling the microprocessor to change mode. Accordingly, the attract mode (or a mode entered when the machine was brought into use) is ended, and a game programme contained in the microprocessor is brought into use. The programme may include the display of information on the screen as to the way of playing the video game, before entering a playing mode in which manually controlled switches L, R and F used by the player to move an image displayed on the screen to the left and to the right, and to fire images representing projectiles.

Because contact FS3 opens in the circuit of the collect relay C, and contact C1 opens in line I and relay CW remains de-energised.

The construction of the microprocessor control unit and its incorporation in the video display unit and connection to a loudspeaker as indicated in Figure 3c, together with its programming, is well-known to those skilled in the art and will not be described further herein. In the event that the player wins the video game in accordance with whatever rules are included in the programme, a relay FP in Figure 3c is energised and closes a contact FP1 in the circuit of the cash payout relay CPR shown in Figure 3b to cause a cash prize to be dispensed without involving the payout timer.

The circuits associated with the microprocessor control unit may be readily modified to cause changes in presentation on the screen in response to energisation of the relays CW, CT and FW so that the fact of cash, token or feature wins is indicated visually on the screen.

Following the completion of a full sequence of operation on the machine, the control timer is returned to its start position as a result of a signal produced by closing of a further contact (not shown) of the collect relay C or the return of the payout timer to its home position, or the closing of a contact of a reset relay RS in the circuit of the video feature control board. Just before the control timer reaches its start position, all latched relays are released, and the machine re-enters the attract mode.

Of course, a practical construction of the machine requires circuits and components further to those described and illustrated for the purpose of explaining the inter-relationship between the reel and the video unit. These further circuits and components will be familiar to those skilled in the mechanical and video gaming machine arts.

The sequence of operations is illustrated in Figure 2, whereln it is assumed that the matching of symbols on the first and second reels leads to a normal cash or token win, while the matching of all reels leads to a feature win.

The electro-mechanical game unit may be controlled by a microprocessor control unit of a type conventionally available which is re-programmed to give additional input and output controls as shown in Figure 4, which is a block diagram showing the basic machine controller, together with the display

logic from an input/output (I/O) circuitry.

Most microprocessor controllers have spare input and output capabilities and this may be used for communication with the display logic as indicated. If, however, no spare capacity exists it is necessary to extend the input/output as follows.

An unused device address is selected and used to control an interface with latched output, these being offered to the data input through a similar unit on the display logic. A circuit diagram of the unit including a quad latch IC1 and three state buffer IC2 is shown in Figure 5. The data received back is strobed onto the data bus when the read/write control line is low and the correct device address is present on the address bus. Therefore, data is input and output in a similar manner to storing and retrieving data from a memory location.

In use, the microprocessor controls the game functions according to the data stored in its permanent memory, performing electronically the tasks described above in relation to electro-mechanical controllers. However, when a feature win is detected and the player elects to play the video game, a signal is output to the video logic, this being in the form of setting one of, for example, four data bits. The display which will be in its attract mode will frequently sample these data lines and when the appropriate bit is set, will commence the video game. At the conclusion of the game, information as to the amount to be paid out will be written on the video's quad output latch. This will be detected by the gaming controls, whilst the video game was being played, would continually sample its input interface to await the arrival of payout information. The appropriate prize is then output and when complete the gaming control writes zeros into its four bit latch as an acknowledgement that the payment is complete and will revert to its normal function. The video logic should not detect the absence of the initializing and write zeros into its output register, after which it reverts to the attract mode, the sequence being complete.

A single microprocessor control unit may be used to combine both the spinning reel and video logic into one unit as only one function is required at a time.

Although as described herein the reels rotate about a common axis in conventional fruit machine manner, and have the symbols of the peripheral surfaces of the reels, it will be appreciated that it is possible for the reels to be replaced by discs, for example, which rotate about respective parallel axes. Reference is hereby directed to British Patent Application No. 8105918 from which this present application is divided.

CLAIMS

1. A gaming or amusement machine including a plurality of rotatable reels bearing indicia, a drive mechanism for setting the reels in motion, actuation of the drive mechanism being caused or permitted by a coin or token-freed device, a mechanism for releasing to the player at least one coin or token following halting of the reels in a predetermined winning relationship, a video display screen, and an electronic unit for generating a signal which is displayed as an image on the screen indicative of information concerning the game to be played on the machine, the electronic unit being reprogrammable to vary the display.

2. A gaming or amusement machine including a plurality of rotatable reels bearing indicia, a drive mechanism for setting the reels in motion, a video means including electronic means for generating a signal, and a video display screen on which the signal is displayed as an image, the electronic means being adapted to permit a video game to be played wherein the operation of the video means to play a video game is permitted to take place only following halting of the reels in a predetermined winning relationship.

3. A gaming or amusement machine including a plurality of rotatable reels bearing indicia, a drive mechanism for setting the reels in motion, actuation of the drive mechanism being caused or permitted by a coin or token-freed device, a video game unit including electronic means for generating a signal and a video display screen on which the signal is displayed as an image, the electronic means being controllable either by the player or operating at least partially at random, and a mechanism for releasing to the player at least one coin or token following the display on the screen of a predetermined image; wherein initiation of the operation of the video game unit or of the coin or token release mechanism is permitted to take place only following halting of the reels in a predetermined winning relationship.

4. A machine as claimed in claim 3, including means operable following halting of the reels in a predetermined winning relationship to selectively initiate operation of the video game unit or of the coin or token release mechanism.

5. A machine as claimed in claim 4, including means for displaying the amount of the players winnings following halting of the reels in a predetermined winning relationship, means for permitting the player to stake all or part of this amount on the outcome of a game played on the video game unit, the display of said amount being reduced by the amount of the stake.

6. A gaming or amusement machine including a plurality of rotatable reels which bear indicia on their peripheral surfaces, a drive mechanism for setting the reels in motion, actuation of the drive mechanism being caused or permitted by a coin or token-freed device, a mechanism for releasing to the player at least one coin or token following halting of the reels in a predetermined winning relationship, an electronic unit for generating a signal and a video display screen on which the signal is displayed as an image indicative of the winning combination of indicia on the reels, the electronic unit being reprogrammable to vary the display.

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